

Fig. 1

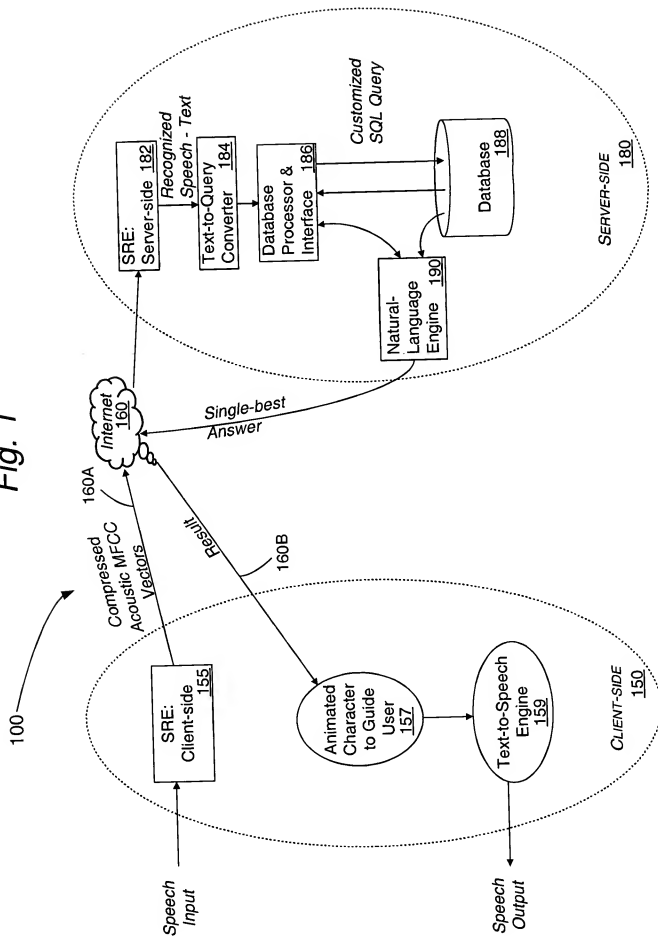


Figure 2A
CLIENT-SIDE SYSTEM LOGIC

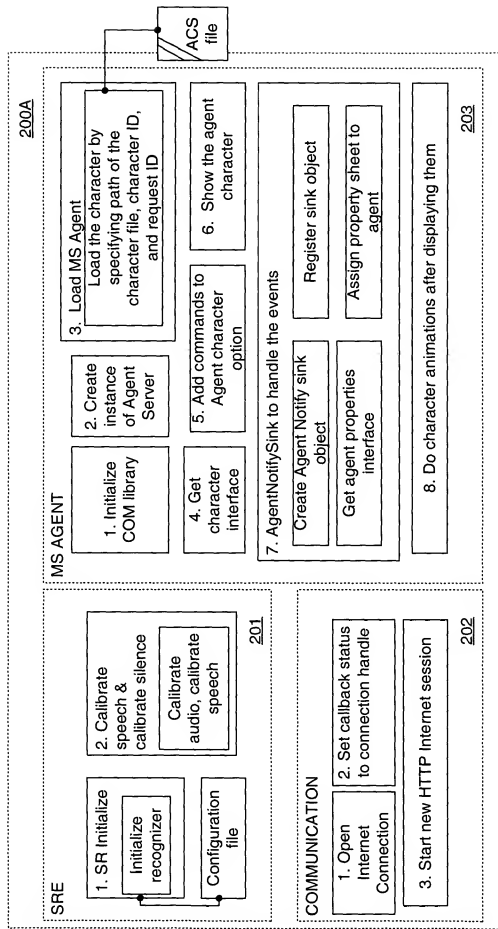


Figure 2B
CLIENT-SIDE SYSTEM LOGIC

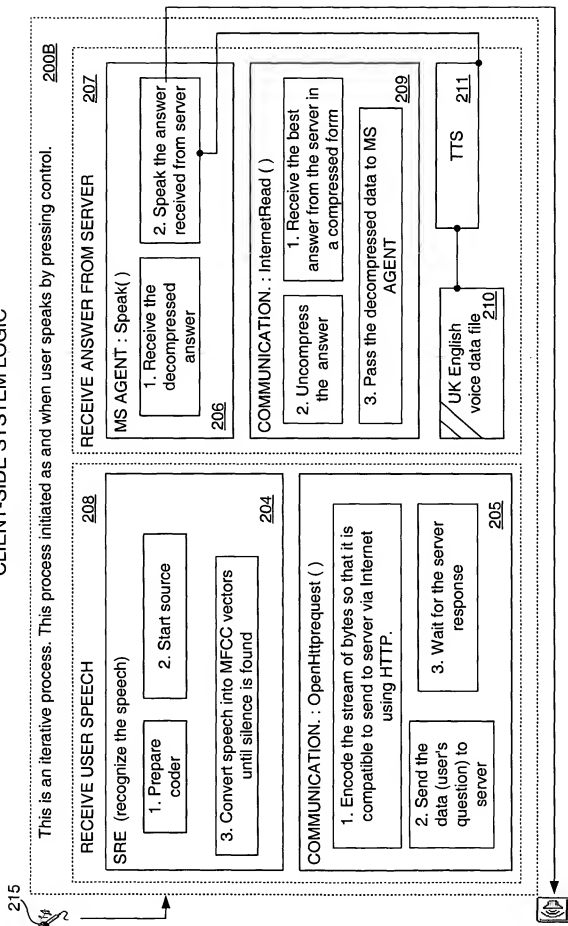


Figure 2C
CLIENT-SIDE SYSTEM LOGIC

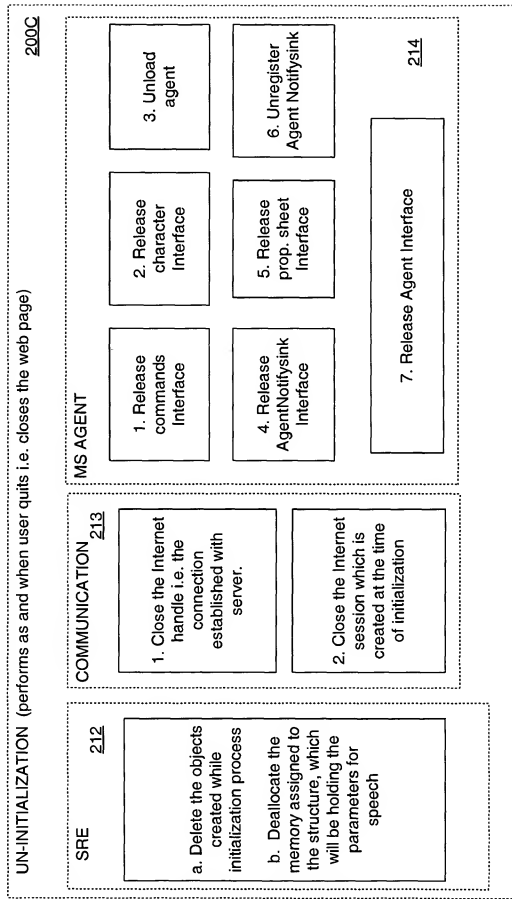


Fig. 2D
Client-side Initialization

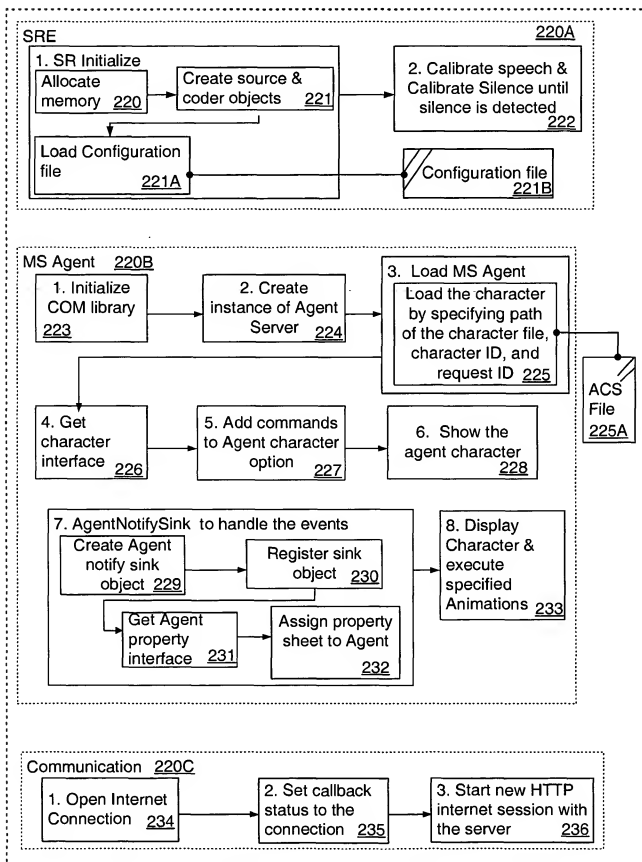


Fig. 3

Client-side Iterative Process

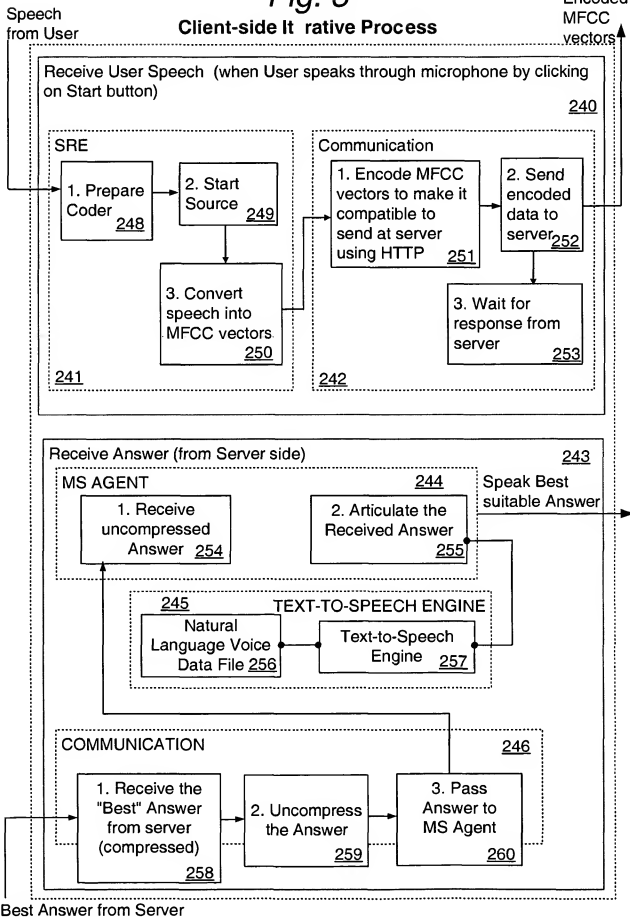


Fig. 4
Client-side Un-Initialization

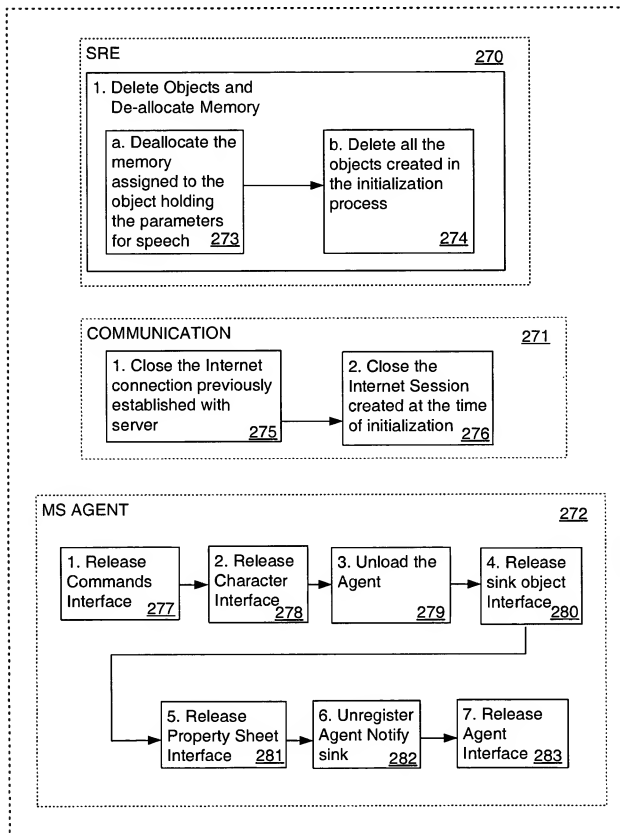
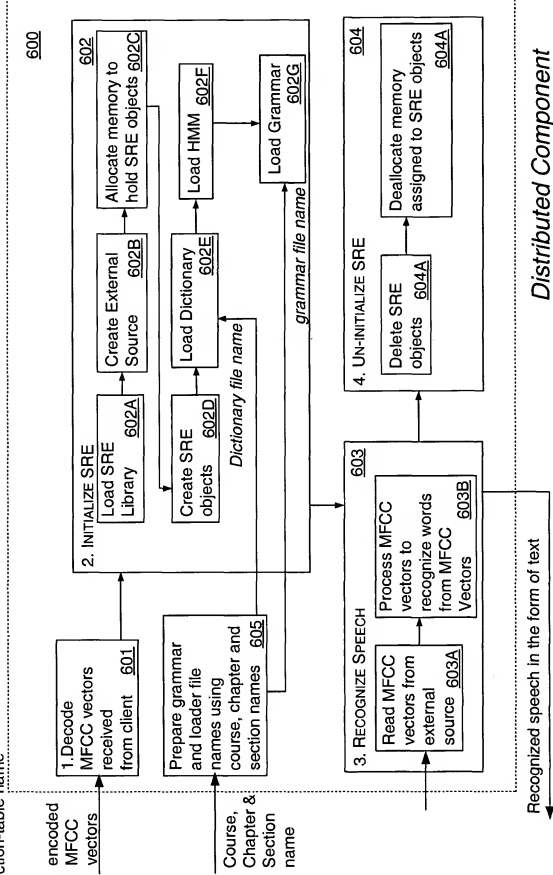


Fig. 4A

Note: course-DB name
chapter-table name
section-table name



*Distributed Component
of SRE at Server-Side*

Fig. 4B
Build of SQL Query

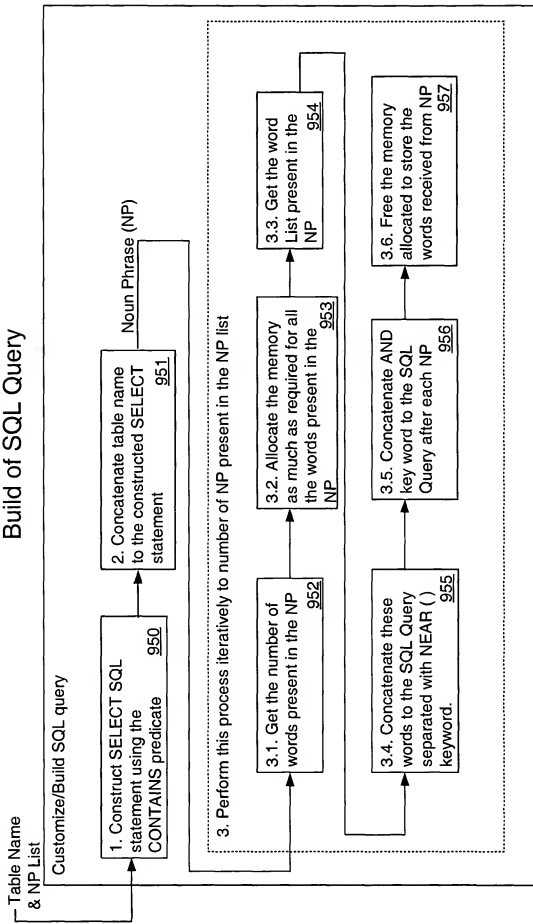


Fig. 4C

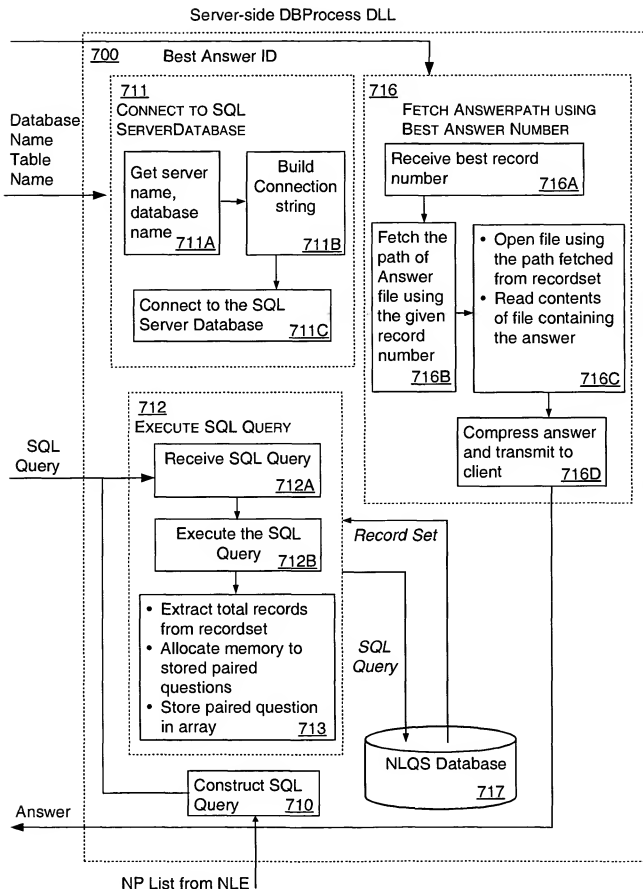


Fig. 4D

Note: PQ - Paired Question **Interface Logic between n**
 NP- Noun Phrase **NLE and DBProcess.DLL**
 Red Line - I/O

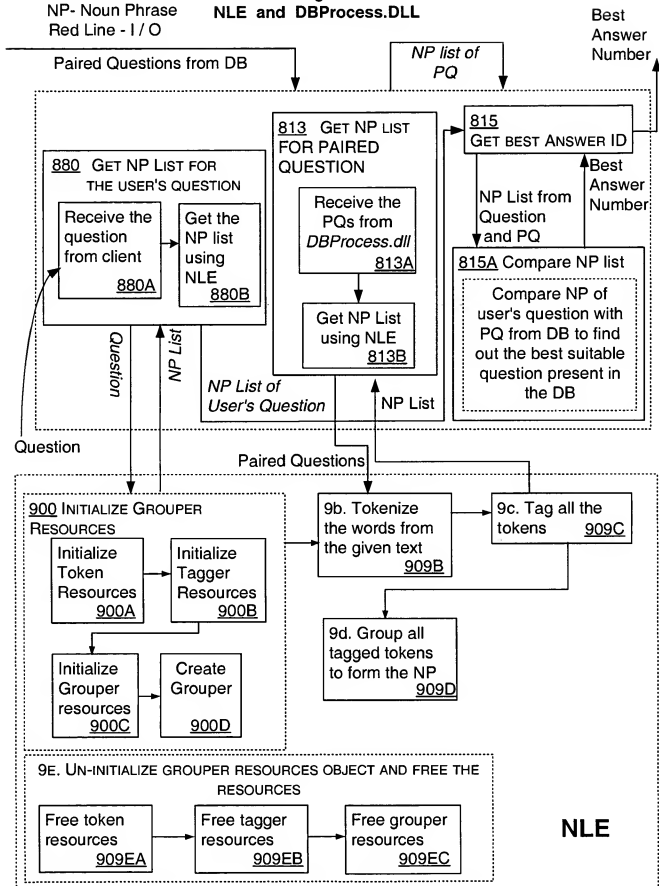


Fig. 5

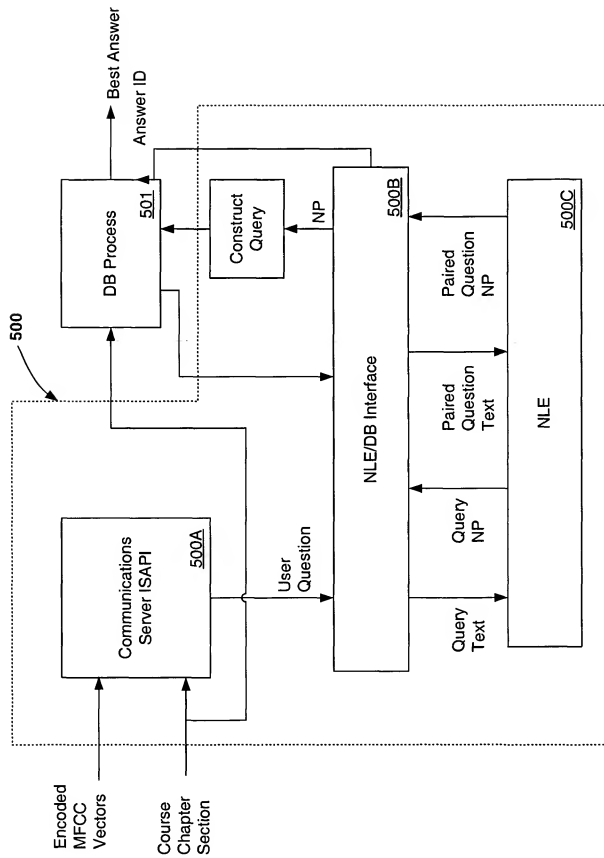


Fig.6

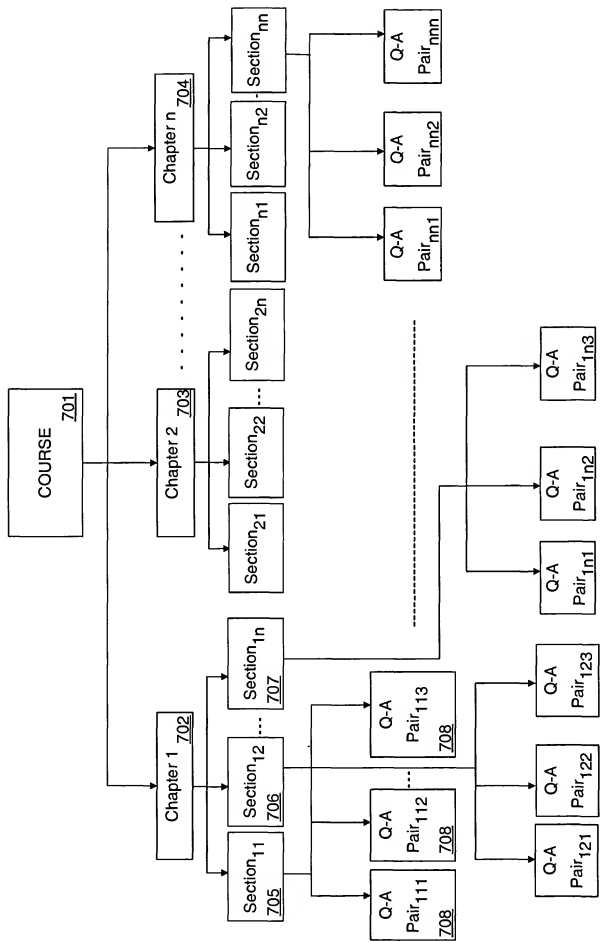


Fig. 7A

FIELD NAME 701A	DATA TYPE 702A	SIZE 703A	NULL 704A	PRIMARY KEY 705A	INDEXED? 706A
ChapterName 707A	Varchar	255	No	No	Yes
SectionName 708A	Varchar	255	No	No	Yes

Fig.7B

FIELD NAME <u>720</u>	DATA TYPE <u>721</u>	SIZE <u>722</u>	NULL <u>723</u>	PRIMARY KEY <u>724</u>	INDEXED? <u>725</u>
Chapter_ID <u>726</u>	Integer		No	Yes	Yes
Answer_ID <u>727</u>	Char	5	No	UNIQUE	Yes
Section_Name <u>728</u>	Varchar	255	No	UNIQUE	Yes
Answer_Title <u>729</u>	Varchar	255	Yes	No	Yes
PairedQuestion <u>730</u>	Text	16	No	No	Yes (Full-Text)
AnswerPath <u>731</u>	Varchar	255	No	No	Yes
Creator <u>732</u>	Varchar	50	No	No	Yes
Date_of_Creation <u>733</u>	Date	-	No	No	Yes
Date_of_Modification <u>734</u>	Date	-	No	No	Yes

Fig. 7C

Field	<u>720</u>	Description	<u>735</u>
AnswerID	<u>727</u>	An integer - automatically incremented for user convenience	
Section_Name	<u>728</u>	Name of section to which the particular record belongs. This field along with AnswerID has to be made primary key	
Answer_Title	<u>729</u>	A short description of the answer	
PairedQuestion	<u>730</u>	Contains one or more combinations of questions for the related answer whose path is stored in the next column AnswerPath	
AnswerPath	<u>731</u>	Contains the path of text file, which contains the answer to the related questions stored in the previous column	
Creator	<u>732</u>	Name of content creator	
Date_of_Creation	<u>733</u>	Date on which content has been added	
Date_of_Modification	<u>734</u>	Date on which content has been changed or modified	

Fig. 7D

FIELD	740	DATA TYPE	741	SIZE	742	NULL	743	PRIMARY KEY	744	INDEXED	745
Answer_ID	746	Char		5		No		Yes		Yes	
Answer_Title	747	Varchar		255		Yes		No		No	
PairedQuestion	748	Text		16		No		No		Yes (Full-Text)	
Answer_Path	749	Varchar		255		No		No		No	
Creator	750	Varchar		50		No		No		No	
Date_of_Creation	751	Date		-		No		No		No	
Date_of_Modification	752	Date		-		No		No		No	

Fig. 8

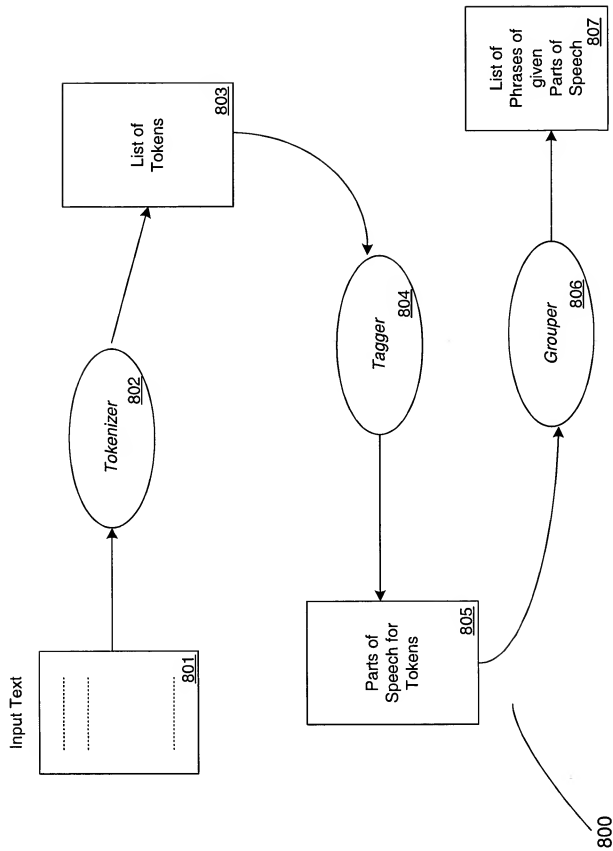


Fig. 9

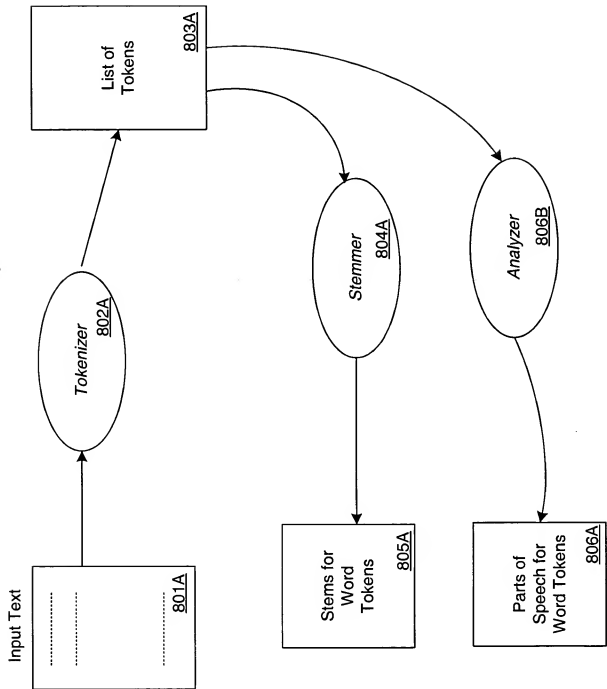


Fig. 10

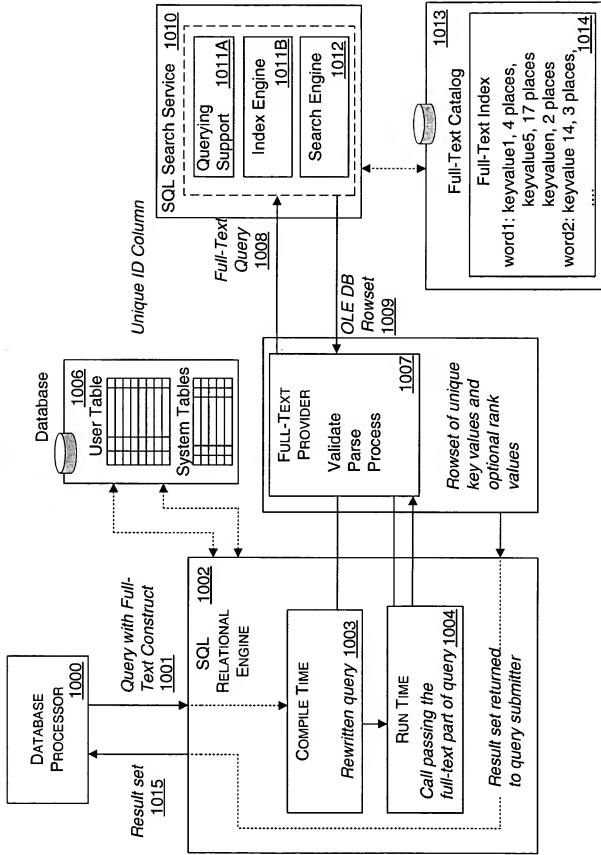


Fig. 11A

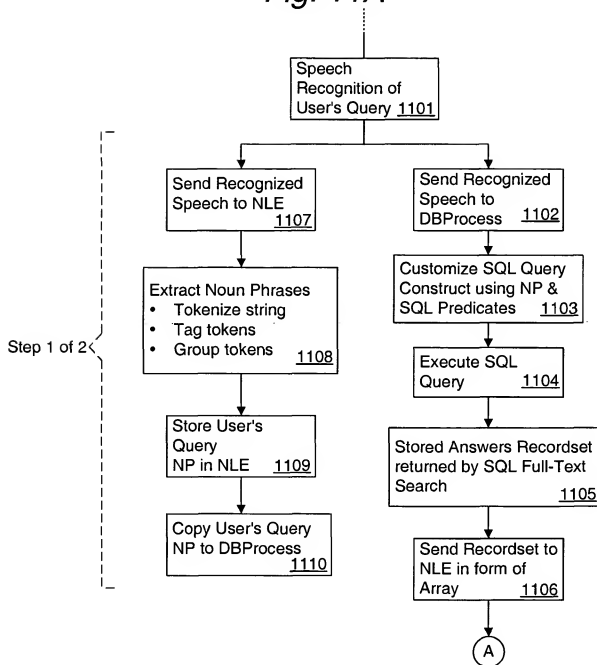


Fig. 11B

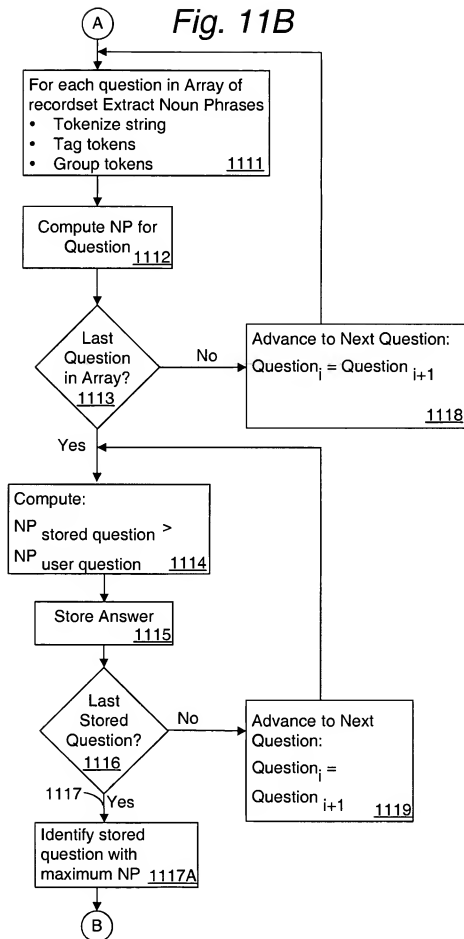


Fig. 11C

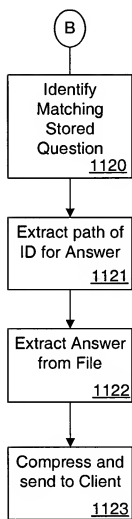


Fig. 12

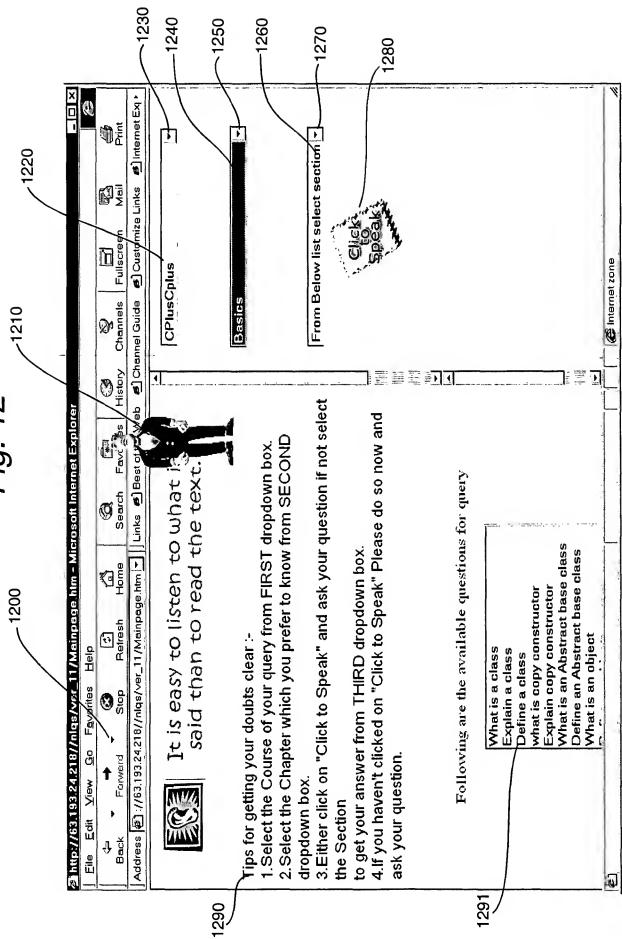


Fig. 13

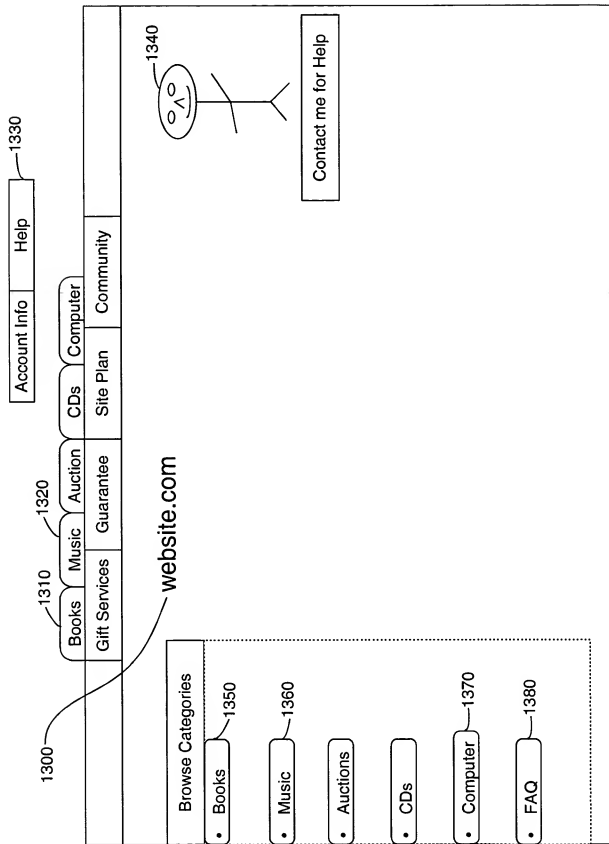


Fig. 14

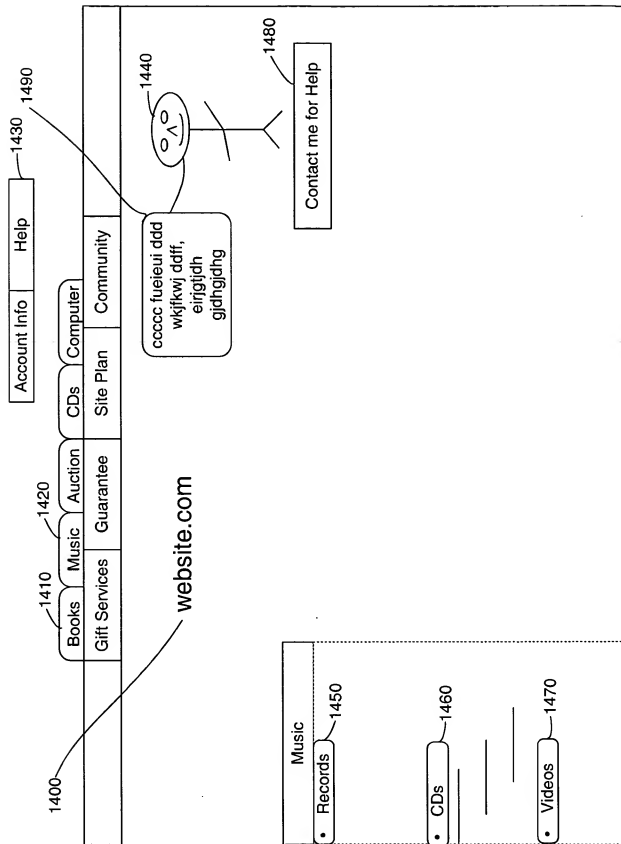


Fig. 15

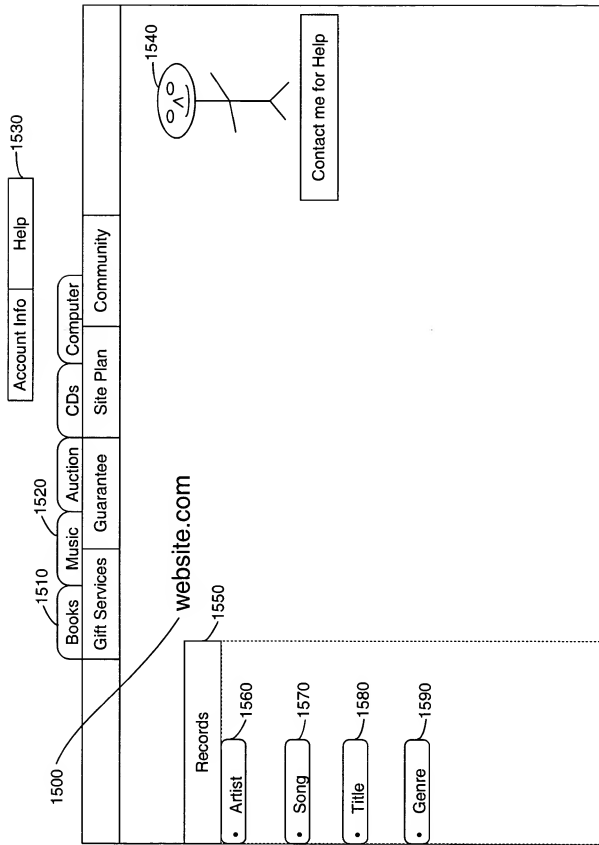


Fig. 16

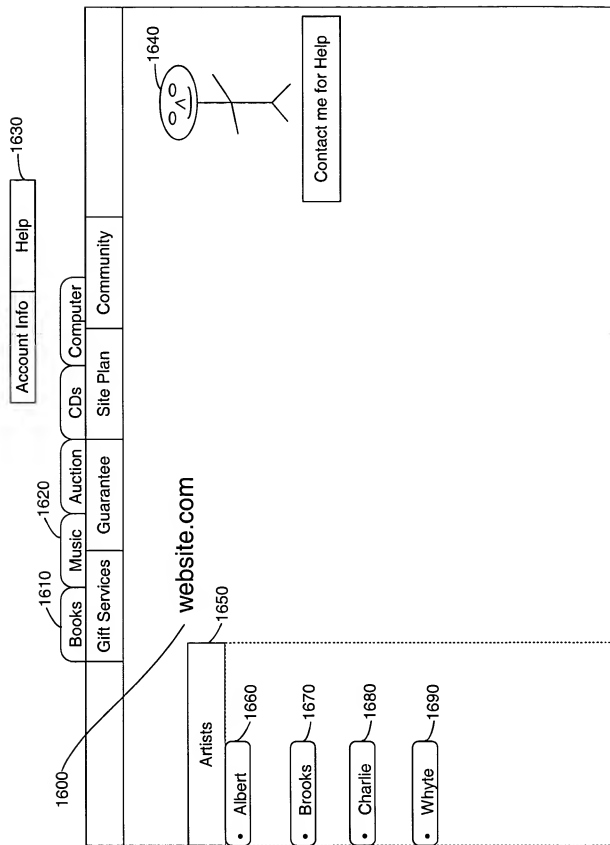


Fig. 17

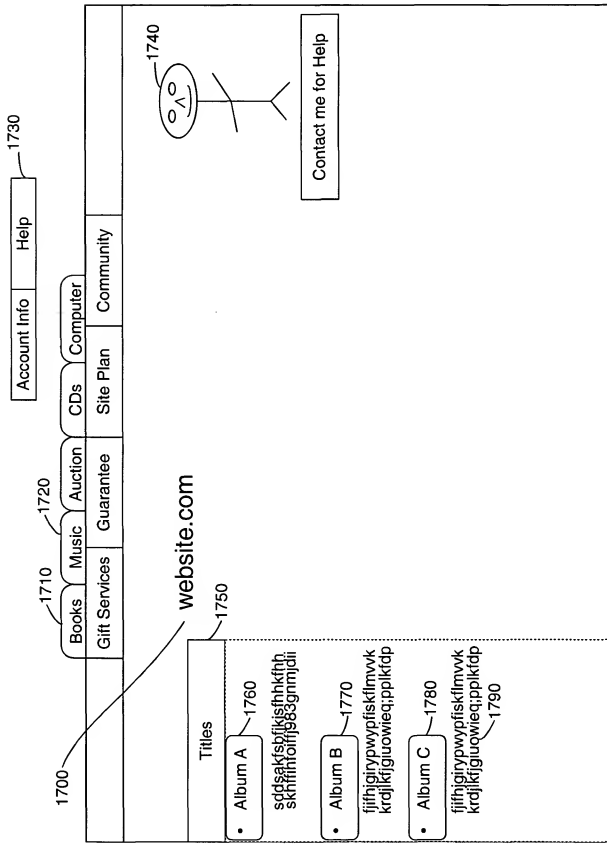


Fig. 18A

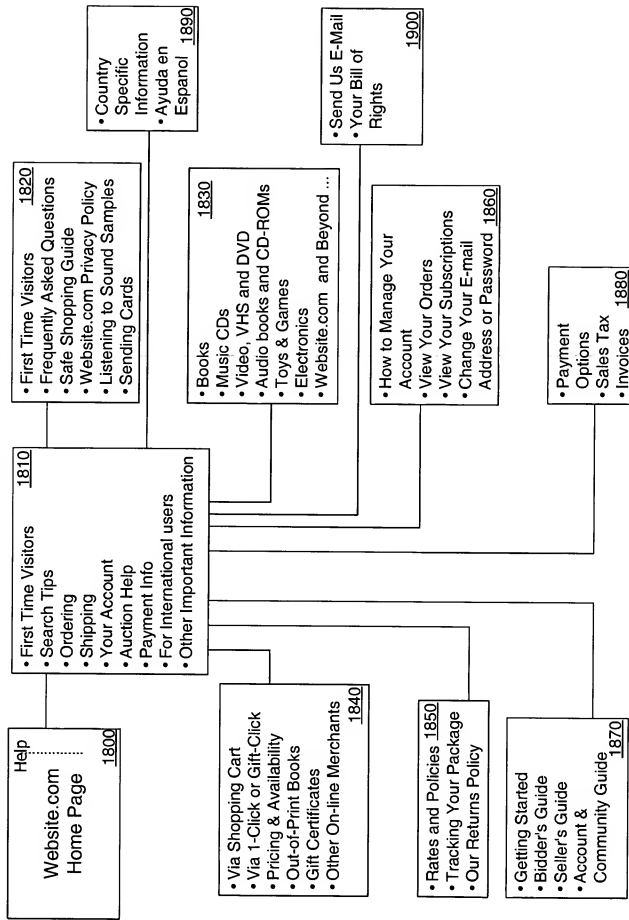


Fig. 18B

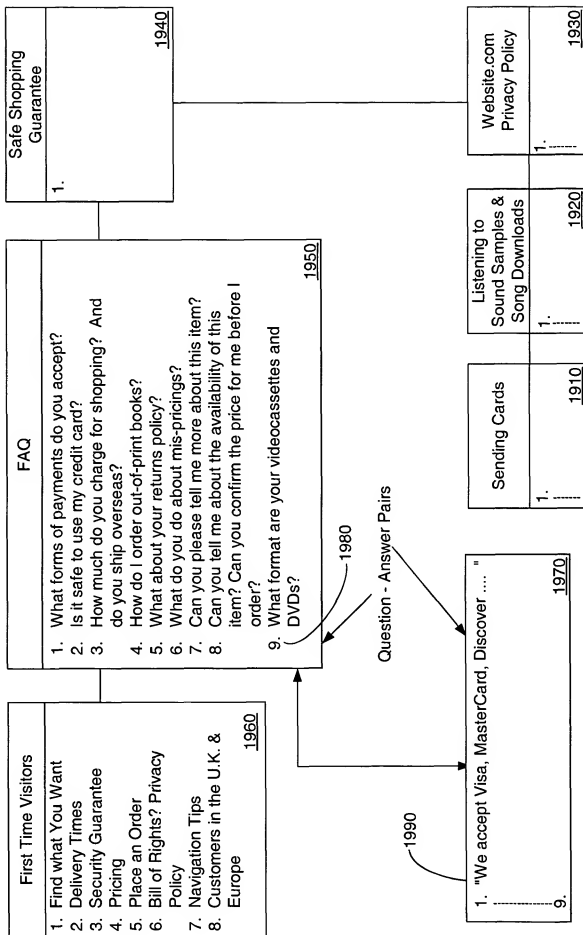


Fig. 19

Computing Semantic Distance
between User Query and Stored Question

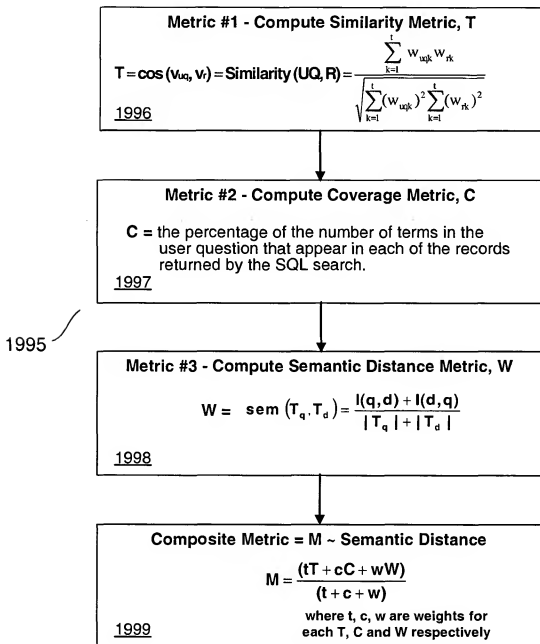


Fig. 20

Populating the Speech Lattice with
Semantically Variant Questions

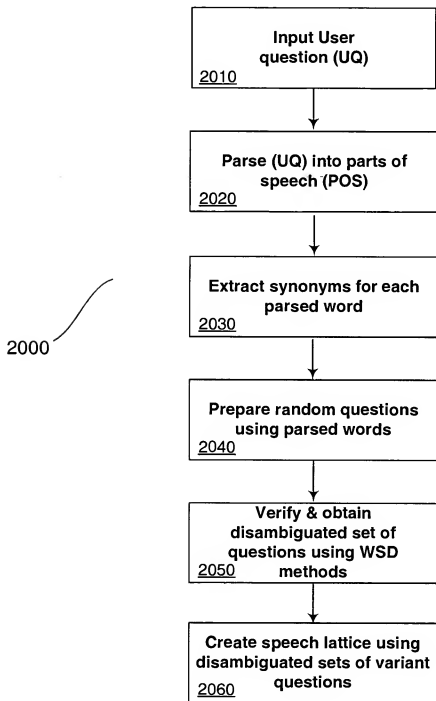


Fig. 21

Integrated NLQS Algorithm that combines WordNet-based Semantic- and Statistics-based Processing

Integrated NLE Algorithm: Statistics- and Semantic-based Natural Language Processing

1. Query the database using the **LIKE** predicate for the exact **UQ**.
If there is a match, go to step 6
2. Decompose **UQ** into noun phrases, verbs and other parts of speech and store into array
3. Query the database using the **CONTAINS** predicate for **NPs** and **Nouns**
 - a. If the result set is == 0 then use **FREETEXT**
 - b. Else - If no return, go to WordNet semantic processing (no direct match)
 - c. If the result set is == 1 then go to step 6
 - d. Else if the result set is > 1 then go to step 4
4. Query the result set using the **CONTAINS** predicate for the next preferred part of speech - e.g. **Verbs**, then **Adjectives**, then **Adverbs**
 - a. If the result set is == 0 then revert to the previous **PQ** list and go to step 5.
 - b. If the result set is == 1 then go to step 6
 - c. Else if the result set is > 1 then repeat 4 with the next part of speech e.g. adjective
5. Now decompose the remaining **PQs** using NLE parser into the various parts of speech. Then do comparisons of the **NPs**, **Verbs** between the **PQs** and the **UQ**. Select the **PQ** with the highest score. Go to step 6 with selected **PQ**
6. Return the answer corresponding to the selected question (**UQ** or **PQ**)
7. If more than 2 questions have the same rank, then go to WordNet semantic processing